PATENT

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| Appellant: | Alex C. Toy;<br>John W. Forsberg | Confirmation No. | 9367 |
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| Examiner: | Michael William Kahelin | | |
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| Title: | MEDICAL DEVICE PROGRAMMER WITH REDUCED-NOISE POWER SUPPLY | | |

**REPLY BRIEF**

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
Alexandria, VA 22313-1450

Dear Sir:

This is a Reply Brief responsive to the final Office Action mailed on March 30, 2009 and the Examiner's Answer mailed on October 30, 2009. Accordingly, the due date for this Reply Brief is December 30, 2009.

No fees are believed to be due at this time. Please charge any fees that may be required or credit any overpayment to Deposit Account No. 50-1778.

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## STATUS OF CLAIMS

Claims 1–10, 12–27, 29–43, 45–51, and 53–69 are pending and are the subject of this Appeal. The claims on appeal are set forth in Appendix A of the Appeal Brief filed on August 31, 2009.

The application as originally filed included claims 1–50. Originally filed claims 11, 28, and 44 were canceled by way of an Amendment filed on December 10, 2007. Claims 51–58 were added by way of a Preliminary Amendment filed on March 9, 2004. Claim 52 was subsequently canceled by way of the Amendment filed on December 10, 2007. Claim 59 was added by way of an Amendment filed on June 26, 2007. Claims 60–65 were added by way of an Amendment filed on June 23, 2008, and claims 66–69 were added by way of an Amendment filed on January 16, 2009.

Claims 1–10, 12–27, 29–43, 45–51, and 53–69 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,055,168 to Kotowski et al. (hereinafter, "Kotowski") in view of U.S. Patent Application No. 2003/0065370 to Lebel et al. (hereinafter "Lebel").

## GROUND OF REJECTION TO BE REVIEWED ON APPEAL

The ground of rejection to be reviewed on appeal is the final rejection of claims 1–10, 12–27, 29–43, 45–51, and 53–69 under 35 U.S.C. § 103(a) as being unpatentable over Kotowski in view of Lebel.

## REMARKS

In the Examiner's Answer to Appellant's Appeal Brief, the Examiner provided new arguments in the section titled, "Response to Argument" beginning on page 8 (item 10) of the Examiner's Answer. For brevity, this Reply Brief only addresses aspects of these arguments. Accordingly, this Reply Brief is not intended to address all arguments provided in the Examiner's Answer, and Appellant requests full consideration of all arguments as set forth in the Appeal Brief filed on August 31, 2009. In addition, Appellant respectfully requests separate review of each set of claims argued under the separate headings presented in the Appeal Brief.

**Claims 1–3, 10, 12, 14–20, 27, 29, 31–37, 43, 45, 47–51, 53, 55–59, and 66–69**

Kotowski fails to disclose or suggest, among other things, a controller circuit adapted to inhibit pulse skipping by a boost converter when a level of the battery voltage is greater than a threshold voltage, as required by Appellant's independent claim 1.

Kotowski describes a switched capacitor circuit that receives an unregulated voltage (e.g., from a battery) and outputs a regulated voltage to an electronic device or load.[1] According to Kotowski, the gain of the switched capacitor circuit is selected based on a desired output voltage or load current and must also be greater than a minimum gain needed to ensure that the desired output voltage is met or exceeded.[2] Kotowski discloses determining the minimum gain based on the input voltage of the switched capacitor circuit.[3]

Kotowski also discloses a comparator that compares the output voltage of the switched capacitor circuit to the desired output voltage for the switched capacitor circuit.[4] According to Kotowski, if the output voltage is less than the desired output voltage, the comparator sends a "pump" signal to the switched capacitor circuit to indicate that more current is needed.[5] In response to receiving the "pump" signal, the switched capacitor

[1] Kotowski at col. 3, ll. 10–19.
[2] *Id.* at col. 3, ll. 1–5.
[3] *Id.* at col. 3, l. 9 to col. 4, l. 8.
[4] *Id.* at col. 3, ll. 36–55.
[5] *Id.* at col. 3, ll. 26–30.

circuit maintains the frequency of clock pulses, i.e., does not skip a clock pulse.[6] If the output voltage is greater than or equal to the desired output, the comparator sends a skip signal to the switched capacitor circuit to indicate that the output voltage is sufficient and the switched capacitor circuit should not transfer any more charge to the output, i.e., the switched capacitor circuit should skip a clock pulse.[7]

According to Kotowski, the gain of the switched capacitor circuit is increased or decreased based on the trend of the output voltages.[8] For example, if a consecutive number of "pump" signals are detected, the gain is increased. Likewise, if a consecutive number of "skip" signals are detected, the gain is decreased. Regardless of the number of consecutive "skip" signals, the gain is not allowed to decrease below a minimum gain.[9] According to Kotowski, the minimum gain is the minimum gain needed to ensure that the desired output voltage is met or exceeded.[10] The value of the minimum gain is based on the voltage input into the switched array circuit, the desired output voltage, and the gain configurations allowed by the switched array circuit.[11]

In the Response to Arguments section of the Examiner's Answer, the Examiner stated that both the minimum gain and the actual gain of the DC-DC converter of Kotowski are at least based on the battery voltage and adjusted when a level of the battery voltage is greater than a threshold voltage.[12] The Examiner acknowledged that FIG. 3 of Kotowski shows the comparator for gain switching to be element 360 on the output side of the DC-DC converter. However, the Examiner stated that the voltage measured at this point is directly proportional to the input voltage, i.e., battery voltage, because the output voltage is the input voltage multiplied by the gain. The Examiner reasoned that this output voltage is high when the battery voltage is high and low when the battery voltage is low, so despite the fact that Kotowski explicitly discloses adjusting the gain based on the measured output voltage, the gain is adjusted when a level of the

[6] *Id.*
[7] *Id.* at col. 3, ll. 19–35.
[8] *Id.* at col. 3, ll. 36–44.
[9] *Id.* at col. 3, ll. 56–60.
[10] *Id.* at col. 3, ll. 56–60.
[11] *Id.* at col. 3, ll. 60–65.
[12] Examiner's Answer dated 10/30/09 at p. 8.

battery voltage is greater than a threshold voltage.[13] Appellant disagrees with the Examiner's assertions.

The Examiner's conclusion regarding the relationship between the output voltage and battery voltage is erroneous. A high voltage output by the switching capacitor circuit of Kotowski does not necessarily mean that the battery voltage is high. For example, even if the battery voltage of Kotowski is low, the output voltage of the switching capacitor circuit may be high relative to a desired output voltage if the gain setting is too high for the given battery voltage. Because the output voltage of the switched capacitor circuit depends upon a gain setting, it is clear that the output voltage of the switched capacitor circuit does not necessarily indicate the battery voltage. The output voltage of the switching capacitor circuit may provide insight into the suitability of the selected gain setting for a given battery voltage and does not necessarily indicate that the battery voltage exceeds a threshold, as asserted by the Examiner.

As previously described, the switched capacitor circuit of Kotowski skips a clock pulse when a level of an output voltage of the switched capacitor circuit (and not an output voltage of the battery) is greater than a desired output voltage, and the gain of the switched capacitor is decreased when the switched capacitor skips a clock pulse a threshold number of times. The mere fact that a gain parameter is modified because of a recent trend in skip signals does not indicate that the battery voltage is greater than or equal to a threshold value. Rather, in Kotowski, if a gain parameter is modified because of a certain number of skip signals have been detected, it can only be discerned that the gain value was undesirable.

In Kotowski, when the output voltage of the switched capacitor circuit exceeds a desired output voltage, it does not necessarily follow that the input voltage (from the battery) exceeds a threshold, as asserted by the Examiner. [14] An output voltage that exceeds the desired output voltage may simply indicate that the gain setting is too large for the given input voltage and desired output voltage. Thus, a reduction in the gain setting of the switched capacitor circuit may merely indicate that the gain setting was too high for the input voltage, thereby resulting in an output voltage that is greater than a

[13] *Id.* at pp. 8 and 9.
[14] *Id.*

desired output voltage. A reduction in a gain setting does not necessarily indicate that the input voltage exceeds a threshold voltage.

The fact that a certain characteristic may be present in the prior art is not sufficient to establish the inherency of that result or characteristic.[15] There must be a basis in fact and/or technical reasoning to reasonably support a determination that an allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.[16] Kotowski does not provide reasonable support for the determination that in Kotowski, the reduction in a gain setting necessarily indicates that the input voltage from the battery exceeds a threshold voltage. The output voltage of the Kotowski switched capacitor circuit does not in any way suggest that the input voltage (i.e., the battery voltage according to the Examiner) is greater than a threshold voltage, as suggested by the Examiner. For at least these reasons, Kotowski fails to inherently disclose a control circuit that is adapted to inhibit pulse skipping by a boost converter when a level of the battery voltage is greater than a threshold voltage.

The Examiner also noted that the Kotowski system skips a pulse when the output of the switched capacitor array exceeds a threshold, i.e., the desired output voltage displayed by reference generator 370.[17] Appellant submits that this is generally consistent with stand pulse skipping operation. In Kotowski, if the output voltage of the switched capacitor circuit exceeds a threshold, the switched capacitor skips a clock pulse, which seems generally consistent with a standard pulse skipping operation. In contrast, Appellant's independent claims require the boost converter to inhibit pulse skipping when a level of a battery voltage is greater than a threshold voltage. Whereas Kotowski considers the output voltage for purposes of pulse skipping, the claimed invention considers the battery voltage for purposes of inhibiting pulse skipping. The battery voltage is different than the output voltage of the switched capacitor circuit disclosed by Kotowski. Although Kotowski describes pulse skipping when an output voltage exceeds a reference output voltage, as is generally consistent with pulse skipping operations,

[15] *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ.2d 1955, 1957 (Fed. Cir. 1993); MPEP § 2112.
[16] *Ex parte Levy*, 17 USPQ.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original); MPEP 2112.
[17] Examiner's Answer dated 10/30/09 at p. 9.

Kotowski does not disclose or suggest inhibiting pulse skipping when a battery voltage exceeds a threshold.

In the Examiner's Answer, the Examiner continued to assert that the "threshold" in Appellant's claim 1 does not require a preset or even a constant threshold. As noted in the Appeal Brief (at page 12), a threshold value, by its very nature, is a predetermined value. Thus, although claim 1, as well as the other claims do not explicitly state that the threshold is predetermined or preset, to characterize a threshold value as an arbitrary value is to effectively vitiate the requirement of claim 1 that a control circuit is adapted to inhibit pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage. Moreover, a threshold voltage, by its very nature, is a known value, rather than an ad hoc value determined after the Kotowski system skips a pulse, as the Examiner asserts. That is, the Examiner appears to be asserting that in Kotowski, the threshold voltage is whatever voltage value triggers the switched capacitor circuit to skip a pulse, i.e., the battery voltage value that is observed when the output voltage of the switched capacitor circuit is greater than the desired output voltage. However, because this voltage value that triggers the pulse skipping is not known until after the pulse skipping occurs, the voltage value cannot reasonably be characterized as a threshold voltage at which a control circuit inhibits pulse skipping in accordance with Appellant's claim 1.

For at least the reasons discussed above with respect to independent claim 1, Kotowski in view of Lebel also fails to disclose or suggest a method that comprises applying a battery voltage to a boost converter to convert the battery voltage to an operating voltage for the programmer and inhibiting pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage, as recited by independent claim 18.

In addition, for at least the reasons discussed above with respect to independent claim 1, independent claim 35 and 51 are patentable over Kotowski in view of Lebel. For example, Kotowski in view of Lebel fails to disclose or suggest a system for controlling a power supply in a programmer for a medical device, the system comprising

means for applying a battery voltage to a boost converter to convert the battery voltage to an operating voltage for the programmer and means for inhibiting pulse

skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage, as recited by claim 35. As another example, Kotowski in view of Lebel fails to disclose or suggest a programmer that includes, among other things, a fixed-frequency switching mode boost converter adapted to convert a battery voltage to an operating voltage for the programmer, where the boost converter activates pulse skipping when the operating voltage exceeds a reference voltage, and a control circuit adapted to inhibit pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage.

**Claims 60, 62, and 64**

Independent claims 60, 62, and 64 further require, in part, inhibiting pulse skipping by the boost converter by limiting the level of the battery voltage applied to the boost converter. In the Response to Argument section of the Examiner's Answer, the Examiner maintained that the capacitor array 310 of Kotowski limits the level of the battery voltage applied to, e.g., the *output* of the boost converter.[18] Appellant reiterates that the Examiner's interpretation of independent claims 60, 62, and 64 is unreasonable and inconsistent with Appellant's specification. As is well-established, during patent examination, the pending claims must be given their broadest reasonable interpretation consistent with the specification.[19]

As discussed in Appellant's specification, a battery voltage can be decreased, thereby reducing an input voltage to a boost converter and inhibiting pulse skipping.[20] Appellant's disclosure also states that an input voltage level V_IN for application to a boost converter can be reduced when the input voltage level V_IN exceeds a threshold voltage.[21] Thus, Appellant's claim language itself, as well as the specification, indicates that a voltage applied to a boost converter can be an input voltage. For at least these reasons, the Examiner's characterization of the voltage applied to the output of the boost converter, i.e., the voltage output by the boost converter, as the voltage applied to the boost converter itself is unreasonable and inconsistent with Appellant's specification.

[18] *Id.* at p. 10 (emphasis in original).
[19] *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005); *see also* MPEP 2111.
[20] Appellant's disclosure at p. 8, l. 31 – p. 9, l. 2.
[21] *Id.* at p. 10, ll. 8–10.

Furthermore, it is unclear how a battery voltage can be applied to an output of a boost converter. A boost converter receives the battery voltage as an input and converts the battery voltage to an operating voltage.

Kotowski fails to disclose or suggest limiting a level of a battery voltage applied to a boost converter when the battery voltage exceeds a threshold voltage, thereby inhibiting performance of pulse skipping by the boost converter, as required by Appellant's independent claims 60, 62, and 64. It is clear from FIGS. 3 and 5 of Kotowski that one voltage, the input voltage from the battery, is applied to the DC-DC converter 300. Although the converter 300 may manipulate that voltage within the converter to produce an output voltage, the only voltage applied to converter 300 is the input voltage from the battery, which Kotowski fails to disclose, is limited to inhibit performance of pulse skipping by a boost converter.

**Claims 13, 30, 46, and 54**

In the Response to Argument section of the Examiner's Answer, the Examiner included remarks consistent with those described with respect to claims 60, 62, and 64. For at least the reasons discussed with respect to independent claims 60, 62, and 64, the Examiner's assertion that a voltage applied to the boost converter is synonymous with the voltage applied to the output of the boost converter[22] is erroneous and an improper basis for rejecting claims 13, 30, 46, and 54..

**Claims 4, 21, 38, 63, and 65**

With respect to dependent claims 4, 21, 38, 63, and 65, Kotowski fails to disclose or suggest a transistor that transmits the battery voltage to the boost converter when the transistor is ON, wherein the transistor turns OFF when the battery voltage exceeds the threshold voltage.

In the Response to Arguments section of the Examiner's Answer, the Examiner stated that the switched capacitor array of the DC-DC converter modifies the gain based on battery voltage, and the gain of the switched capacitor array is modified by turning

[22] Examiner's Answer dated 10/30/09 at p. 10.

transistors on and off.[23] This assertion reflects a misunderstanding of Appellant's claims. As described previously, the switched capacitor array is a component of the DC-DC converter disclosed by Kotowski and an input voltage from a battery is input to the switched capacitor array. Nothing in Kotowski discloses or suggests that the DC-DC converter receives different inputs based on battery voltage, as controlled by switching of a transistor. Instead, Kotowski discloses that a capacitor array 10 within the DC-DC converter merely receives the input voltage from the battery.[24] While Kotowski discloses that the gain of capacitor array 10 within the DC-DC converter may be adjusted, Kotowski does not disclose a transistor coupled to transmit the battery voltage to the DC-DC converter when the transistor is ON, where the transistor turns OFF when the battery voltage exceeds the threshold. Thus, the Examiner's assertion that Kotowski discloses the features of claims 4, 21, 38, 63, and 65 because in Kotowski, the switched capacitor array of the DC-DC converter modifies the gain based on battery voltage, and the gain of the switched capacitor array is modified by turning transistors on and off is misplaced and fails to address the limitations of Appellant's claims 4, 21, 38, 63, and 65.

For at least these reasons, the Examiner's rejection of claims 4, 21, 38, 63, and 65 as being obvious over Kotowski in view of Lebel was erroneous.

**Claims 6–9, 23–26, and 39–42**

Each of claims 6–9, 23–26, and 39–42 depends upon one of claims 4, 21, and 38 and further requires that the transistor transmits the battery voltage, less a diode drop, to the boost converter when the transistor is OFF.

In the Response to Arguments section of the Examiner's Answer, the Examiner stated the Kotowski discloses that the capacitor array is switched with transistors.[25] The Examiner also stated that it is well known in the art that transistor switches have a diode drop, and it is further known in the art to provide the claimed transistor configurations for switching applications, such as Kotowski's, to provide the predictable result of solid-state switching with off-the-shelf parts.

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[23] *Id.* at p. 11.
[24] *See* Kotowski at FIG. 3.
[25] Examiner's Answer dated 10/30/09 at p. 11.

Even if it is well-known to provide the claimed transistor configurations for switching applications, an assertion that Appellant does not necessarily agree with, Kotowski fails to disclose or suggest that the DC-DC converter receives any value other than the battery voltage. Accordingly, contrary to the Examiner's assertions, Kotowski in view of Lebel fails to disclose or suggest a transistor that transmits the battery voltage, less a diode drop, to a boost converter when the transistor is OFF, as required by claims 6–9, 23–26, and 39–42.

**Claims 5, 22, and 61**

With respect to claims 5, 22, and 61, Kotowski in view of Lebel fails to disclose or suggest a comparator to compare the battery voltage to the threshold voltage, where an output of the comparator is coupled to a gate of the transistor to turn the transistor ON and OFF based on the comparison. In the Response to Arguments section of the Examiner's Answer, the Examiner stated that it would have been obvious to modify Kotowski in this manner, since switching a transistor on and off with a comparator to modify a gain is known in the art, as is modifying a gain based on battery voltage.[26] The Examiner further stated that Kotowski discloses modifying a gain by switching a transistor on and off with a comparator and setting a minimum gain based on battery voltage.

As discussed in the Appeal Brief, Kotowski does not disclose modifying a gain of the switched capacitor circuit based on battery voltage. Therefore, the Examiner's proposed rationale for modifying Kotowski in view of Lebel to further include a comparator to compare the battery voltage to the threshold voltage lacks a rational underpinning.[27] In Kotowski, a comparator compares an output voltage of a switched capacitor circuit, which is used to boost a voltage to a desired output voltage for the capacitor circuit. Modifying the Kotowski comparator to compare two different voltage values, as suggested by the Examiner, would change the principle of operation of the Kotowski comparator and the Kotowski system. If a proposed modification of a cited reference would change the principle of operation of the system being modified, the

[26] *Id.* at pp. 11 and 12.
[27] *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

reference is insufficient to render Appellant's claims *prima facie* obvious.[28] Thus, the Examiner's proposed modification to Kotowski is insufficient to establish a *prima facie* case of obviousness of at least claims 5, 22, and 61.

Appellant maintains that there is no apparent reason why one of ordinary skill in the art would have modified Kotowski to include a comparator for the specific application of comparing the battery voltage to a threshold value. Absent access to Appellant's disclosure, there is no apparent reason one having ordinary skill in the art would have modified Kotowski in view of Lebel to include a comparator to compare the battery voltage to the threshold voltage. Kotowski fails to contemplate the battery voltage when adjusting a gain setting, and, therefore, there would be no reason to compare a battery voltage to a threshold voltage.

Claims 5, 22, and 61 also require the threshold voltage to be the same threshold voltage at which pulse skipping by a boost converter is inhibited. As discussed above, Kotowski fails to disclose or suggest inhibiting pulse skipping by the boost converter when a level of the battery voltage is greater than a threshold voltage.

**Claims 66–69**

Claims 66 and 69 require a comparator that compares a level of a battery voltage to a threshold voltage, whereby pulse skipping by a boost converter is inhibited when the level of the battery voltage is greater than the threshold voltage. Claim 67 recites a method that includes comparing the level of the battery voltage to the threshold voltage, and claim 68 recites a system comprising means for comparing the level of the battery voltage to the threshold voltage.

In the Response to Argument section of the Examiner's Answer, the Examiner reasoned that it would have been obvious to one of ordinary skill in the art to modify Kotowski to compare the battery voltage to a reference input voltage instead of comparing the output voltage to a reference output voltage, because the input and output voltages share a linear relationship scaled by the gain value.[29]

[28] MPEP 2143.02, *citing In re Ratti*, 270 F.2d 810 (CCPA 1959).
[29] Examiner's Answer dated 10/30/09 at p. 12.

Appellant respectfully disagrees with this assertion. Kotowski describes monitoring trends in output voltages,[30] which depend upon both the input voltage and the gain setting, to modify a gain setting. By comparing the output signal of the switched capacitor circuit to the desired output voltage, Kotowski considers both the input voltage and the gain setting simultaneously. There is no apparent reason why one of ordinary skill in the art would have modified Kotowski to compare the battery voltage in Kotowski to a reference input voltage instead of comparing the output voltage to a reference output voltage, as asserted by the Examiner. Kotowski is only concerned with maintaining a desired output voltage, and, therefore, monitors the output voltage of the switched capacitor circuit. Given the fact that the entire premise of the Kotowski disclosure is to maximize conversion efficiency by selecting a gain based on output voltage,[31] one having ordinary skill in the art would have consciously avoided modifying Kotowski to select a gain based on the battery input voltage.

## CONCLUSION

For at least these reasons and the reasons discussed in Appellant's Appeal Brief, the Examiner has failed to establish a *prima facie* case for obviousness of Appellant's claims 1–10, 12–27, 29–43, 45–51, and 53–69. In view of Appellant's arguments present in this Reply Brief and in the previously-filed Appeal Brief, the final rejection of Appellant's claims was improper and should be reversed. Reversal of all pending rejections and allowance of all pending claims is respectfully requested.

Date:

December 30, 2009

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[30] Kotowski at col. 3, ll. 36–44.
[31] *See* Kotowski at col. 5, ll. 14-17.